

## CLAIMS

1           1. Apparatus for cleaning residue containing tubes, comprising:  
2           a) a hose having a spray tip containing a plurality of orifices;  
3           b) a water source coupled to said hose capable of delivering water to said hose at a  
4           pressure in excess of 1,000 psi; and

5           c) a framework supporting i) transport means for extending and retracting said  
6           hose with a reciprocating motion, ii) reel means for collecting and distributing said hose  
7           along a longitudinal drive axis common to each of said transport and reel means and  
8           including means for stacking said hose into coils aligned one on top of the other and  
9           concentric to said drive axis and iii) means for simultaneously rotating said transport  
10          means and said reel means, whereby said hose and spray tip are rotated as they extend  
11          and retract along a bore of said tube to clean said residue.

1           2. Apparatus as set forth in claim 1 wherein said reel means includes a hollow  
2           arm that extends from said longitudinal axis and through which arm said hose extends and  
3           is directed to and from a hub mounted concentric to said longitudinal drive axis.

1           3. Apparatus as set forth in claim 2 wherein said hose is collected at a tapered  
2           surface of said hub that extends at an acute angle relative to the longitudinal drive axis.

1           4. Apparatus as set forth in claim 2 wherein said hub exhibits a frustum shape and  
2           is concentrically mounted within a surrounding housing.

1           5. Apparatus as set forth in claim 2 wherein said reel means includes a plurality  
2           of members mounted in length adjustable relation to each other to vary the diameter of  
3           said hub.

1           6. Apparatus as set forth in claim 2 wherein said transport means includes a

2 plurality of pinch rollers mounted to contact said hose and control means for directing the  
3 reciprocating axial movement of said hose in synchrony with the rotational movement of  
4 said hose.

1 7. Apparatus as set forth in claim 6 wherein said pinch rollers are driven by air  
2 operated motors and a chain linkage and said control means comprises an air valve.

1 8. Apparatus as set forth in claim 2 wherein said arm is mounted to pivot relative  
2 to said hub such that said hose can be directed onto said hub in a plurality of stacked  
3 adjacent coils.

1 9. Apparatus as set forth in claim 2 wherein said reel means includes a plurality  
2 of planar members mounted to a plurality annular bands, wherein a tapered channel  
3 extends in each planar member at an acute angle relative to the longitudinal drive axis  
4 and wherein said hose is directed into and from said channel.

1 10. Apparatus as set forth in claim 1 including cleaning means mounted  
2 concentric to said longitudinal drive axis for cleaning the external surface of said hose.

1 11. Apparatus as set forth in claim 10 including a brush mounted concentric to  
2 said longitudinal drive axis for cleaning the external surface of said hose.

1 12. Apparatus as set forth in claim 10 including a manifold mounted concentric to  
2 said longitudinal drive axis and coupled to a water source and having a plurality of outlets  
3 for directing spray to cleaning the external surface of said hose.

1 13. Apparatus as set forth in claim 1 wherein a motor, drive belt and a plurality of  
2 pulleys determine the speed of rotation of said reel means.

1 14. Apparatus for cleaning residue containing tubes, comprising:

2 a) a hose having a spray tip containing a plurality of orifices; and

3           b) a water source coupled to said hose and delivering water thereto at a pressure in  
4 the range of 1,000 to 60,000 psi; and

5           c) a frame work supporting a reel having a hub concentrically mounted to an  
6 outer housing, wherein said reel is mounted to rotate at said framework, arm means  
7 having a hollow bore for directing said hose onto said hub in stacked coils, and means for  
8 rotating said reel means and said hose as said hose is directed to and from said reel  
9 means, whereby said hose and spray tip are rotated as they extend and retract along a  
10 bore of said tube to clean said residue.

1           15. Apparatus as set forth in claim 14 wherein said hub exhibits a frustum shape  
2 and including a manifold mounted concentric to said hose and coupled to a water source  
3 and having a plurality of outlets for directing spray to cleaning the external surface of said  
4 hose.

1           16. Apparatus for cleaning residue containing tubes, comprising:

2           a) a hose having a spray tip containing a plurality of orifices;

3           b) a water source coupled to said hose capable of delivering water to said hose at a  
4 pressure in the range of 1,000 to 60,000 psi;

5           c) a framework supporting i) transport means for extending and retracting said  
6 hose with a reciprocating motion, ii) reel means for collecting and distributing said hose  
7 along a longitudinal drive axis common to each of said transport and reel means and  
8 including a hollow arm that extends at an acute angle relative to said longitudinal axis  
9 and through which arm said hose extends and is directed to and from a tapered surface of a  
10 hub mounted concentric to said longitudinal drive axis such that said hose is stacked in a  
11 plurality of coils aligned one on top of the other and concentric to said drive axis iii)

12 means for simultaneously rotating said transport means and said reel means, whereby said  
13 hose and spray tip are rotated as they extend and retract along a bore of said tube to clean  
14 said residue.

1 17. Apparatus as set forth in claim 16 including a manifold mounted to rotate  
2 concentric to said longitudinal drive axis and coupled to a water source and having a  
3 plurality of outlets for directing spray to cleaning the external surface of said hose.

1 18. Apparatus as set forth in claim 16 wherein a motor, drive belt and a plurality  
2 of pulleys determine the speed of rotation of each of said transport and said reel means.

1 19. Apparatus as set forth in claim 16 wherein said transport means includes a  
2 plurality of pinch rollers mounted to contact said hose, means for controlling the contact  
3 force of said rollers with said hose and air controlled means for directing the  
4 reciprocating axial movement of said hose in synchrony with the rotational movement of  
5 said hose.

1 20. Apparatus for cleaning residue containing tubes, comprising:

2 a) a hose having a spray tip containing a plurality of orifices;

3 b) a water source coupled to said hose capable of delivering water to said hose at a  
4 pressure in the range of 1,000 to 60,000 psi; and

5 c) a framework supporting i) transport means for extending and retracting said  
6 hose with a reciprocating motion and including a plurality of pinch rollers mounted to  
7 contact said hose, means for controlling the contact force of said rollers with said hose  
8 and air controlled means for directing the reciprocating axial movement of said hose, ii)  
9 reel means for collecting and distributing said hose along a longitudinal drive axis  
10 common to each of said transport and reel means and including a hollow arm that extends

11 at an acute angle relative to said longitudinal drive axis and through which arm said hose  
12 extends and is directed to and from a tapered surface of a hub mounted concentric to said  
13 longitudinal drive axis such that said hose is stacked in a plurality of coils aligned one on  
14 top of the other and concentric to said drive axis, iii) means for simultaneously rotating  
15 said transport means and said reel means in synchrony with the rotational movement of  
16 said hose, and iv) a manifold mounted to said framework to rotate concentric to said  
17 longitudinal drive axis and coupled to a water source and having a plurality of outlets for  
18 directing spray to cleaning the external surface of said hose, whereby said hose and spray  
19 tip are rotated as they extend and retract along a bore of said tube to clean said residue.